



Western Technical College

## 10806197 Microbiology

### Course Outcome Summary

#### Course Information

<b>Description</b>	This course examines microbial structure, metabolism, genetics, growth and the relationship between humans and microorganisms. Disease production, epidemiology, host defense mechanisms and the medical impact of microbes in the environment, industry, and biotechnology are also addressed.
<b>Instructional Level</b>	Associate Degree Courses
<b>Total Credits</b>	4
<b>Total Hours</b>	90

#### Textbooks

*Microbiology with Diseases by Taxonomy*. 6th Edition. Copyright 2020. Bauman, Robert W. Publisher: Pearson. **ISBN-13:** 978-0-13-483230-2. Required. (Face to Face and Blended only)

*Foundations in Microbiology – Connect Access*. 10th Edition. Copyright 2018. Talaro, Kathleen Park and Barry Chess. Publisher: McGraw-Hill Publishing Company. **ISBN-13:** 978-1-259-91594-9. Required. (Online only)

#### Learner Supplies

Safety Splash Goggles, ALLSAFE goggle, ANSI Z87.1, Fisher Scientific 19-181-504 or 19-181-502. **Vendor:** Campus Shop. Required for Face to Face and Blended only.

Disposable Lab Coat. **Vendor:** Campus Shop. Required for Face to Face and Blended only..

Sharpie Permanent Marker. **Vendor:** Campus Shop. Required for Face to Face and Blended only..

#### Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Refine Professionalism: Improve Critical Thinking
3. Refine Professionalism: Participate Collaboratively
4. Refine Professionalism: Practice Effective Communication

#### Course Competencies

## 1. Explore the history and scope of the field of microbiology.

### Assessment Strategies

- 1.1. Presentation
- 1.2. Written Objective Test

### Criteria

*You will know you are successful when*

- 1.1. you describe the range of organisms studied by microbiologists.
- 1.2. you relate historical events to the current understanding of microbiology.
- 1.3. you evaluate the relationship between humans and microbes.
- 1.4. you describe the scope of microbes within industrial and environmental applications.
- 1.5. you use correct writing conventions of binomial nomenclature.
- 1.6. you describe classification methods used for grouping organisms.
- 1.7. you recognize the role of microbes in nutrient cycling.
- 1.8. you associate laboratory tools and techniques of microbiology with their use in studying microbes.

### Learning Objectives

- 1.a. Describe the various types of microbes studied by microbiologists.
- 1.b. Describe historical events that led to the development of current microbiology.
- 1.c. Identify the accomplishments of select microbiologists: Leeuwenhoek, Pasteur, Koch, Semmelweis, Snow, Lister, Jenner, Nightingale, Fleming.
- 1.d. Define: spontaneous generation, germ theory, Koch's postulates.
- 1.e. Describe the various relationships between humans and microbes.
- 1.f. Summarize the use of microbes to produce dairy products and industrial products.
- 1.g. Demonstrate proper use of binomial nomenclature.
- 1.h. Describe classification methods as they apply to microbes.
- 1.i. Identify main differences among prokaryotes, eukaryotes, and viruses.
- 1.j. Describe the role of microbes in nutrient recycling.
- 1.k. Relate laboratory tools and techniques to their use in studying microbes.

## 2. Apply safe laboratory practices.

### Assessment Strategies

- 2.1. Skill Demonstration
- 2.2. Performance
- 2.3. Written Product

### Criteria

*You will know you are successful when*

- 2.1. you identify hazards and safety equipment in the microbiology lab.
- 2.2. you select personal protective equipment appropriate to the hazard.
- 2.3. you follow all laboratory practice expectations of the college.
- 2.4. you abide by the O.S.H.A. Guidelines, including Blood-Borne Pathogens Standards.

### Learning Objectives

- 2.a. Identify hazards in the microbiology lab.
- 2.b. Summarize proper use of safety equipment.
- 2.c. Demonstrate proper selection and use of personal protective equipment.
- 2.d. Adhere to all laboratory safety rules according to the expectations of the college.
- 2.e. Abide by O.S.H.A. Guidelines, including Blood-Borne Pathogen Standards.

## 3. Perform microbiological laboratory procedures according to appropriate safety standards.

### Assessment Strategies

- 3.1. Performance
- 3.2. Report
- 3.3. Written Objective Test
- 3.4. Skill Demonstration

### Criteria

*You will know you are successful when*

- 3.1. you perform wet-mount and/or hanging-drop slide preparations.
- 3.2. you perform Gram stains.
- 3.3. you perform aseptic transfers.
- 3.4. you obtain microbial samples for culture.
- 3.5. you isolate colonies and/or plaques.
- 3.6. you recognize pure and mixed cultures.
- 3.7. you use biochemical test media or other means of organism identification.
- 3.8. you accurately record observations and test results.
- 3.9. you correctly use appropriate laboratory equipment.
- 3.10. you use enumeration methods to calculate population density.

#### **Learning Objectives**

- 3.a. Prepare wet mount slides.
- 3.b. Prepare microbial smears for staining.
- 3.c. Perform Gram stain.
- 3.d. Describe the use of the acid-fast stain, capsule stain, flagella stain, and endospore stain.
- 3.e. Transfer bacterial cultures using aseptic techniques.
- 3.f. Obtain samples for microbial culture.
- 3.g. Streak agar plates to obtain isolated colonies.
- 3.h. Differentiate pure and mixed cultures.
- 3.i. Perform biochemical testing procedures.
- 3.j. Interpret results of biochemical procedures accurately.
- 3.k. Use appropriate laboratory equipment correctly.
- 3.l. Calculate microbial numbers in a sample.
- 3.m. Use safe laboratory practices according to the expectations of the college.

### **4. Examine microbial cells using a bright-field microscope.**

#### **Assessment Strategies**

- 4.1. Performance
- 4.2. Report
- 4.3. Written Objective Test
- 4.4. Skill Demonstration

#### **Criteria**

*You will know you are successful when*

- 4.1. you identify parts of the microscope and their functions.
- 4.2. you adjust microscope for optimal viewing.
- 4.3. you focus on a prepared slide sample using the low, high, and oil immersion lenses.
- 4.4. you interpret microscopic observations.
- 4.5. you demonstrate care and clean-up of microscopes.
- 4.6. you contrast other types of microscopy with bright-field microscopy.
- 4.7. you use safe laboratory practices.
- 4.8. you perform microbiological laboratory procedures and techniques according to appropriate safety standards.

#### **Learning Objectives**

- 4.a. Identify the parts of the microscope.
- 4.b. Describe the function of the parts of the microscope.
- 4.c. Adjust the microscope for optimal viewing of select microbes.
- 4.d. Focus on a prepared slide using the low power and oil immersion lenses to see individual microbial cells.
- 4.e. Demonstrate proper use, care, clean-up, and storage of the microscope.
- 4.f. Compare other types of microscopy with bright-field microscopy.

### **5. Compare prokaryotic and eukaryotic cell structures and their functions.**

#### **Assessment Strategies**

- 5.1. Written Objective Test
- 5.2. Case Study

## Criteria

*You will know you are successful when*

- 5.1. you identify components of prokaryotic cells.
- 5.2. you identify components of eukaryotic cells.
- 5.3. you describe the functions of cellular components.
- 5.4. you contrast cellular structure and functions of prokaryotic and eukaryotic cells.
- 5.5. you contrast the size and morphology of prokaryotic and eukaryotic cells.

## Learning Objectives

- 5.a. Create a labeled prokaryotic cell diagram that properly locates cell structures.
- 5.b. Describe the chemical composition of prokaryotic cell structures.
- 5.c. Describe the function of prokaryotic cell structures.
- 5.d. Identify components of eukaryotic cells.
- 5.e. Contrast cell structures and functions for prokaryotic and eukaryotic cells.
- 5.f. Describe characteristics of virus particles.
- 5.g. Contrast prokaryotic Gram positive and Gram negative cell wall structure.
- 5.h. Outline the Gram stain procedure.
- 5.i. Predict the appearance of Gram-positive and Gram-negative cells at each step of the Gram stain.
- 5.j. Identify prokaryotic cell shape using proper terminology.
- 5.k. Describe the steps in endospore formation.
- 5.l. Correlate endospore characteristics with the significance of endospore presence in medical facilities.
- 5.m. List sporicidal methods.
- 5.n. Define sterility as it applies to microbes.

## 6. Explain microbial growth requirements and key microbial metabolic processes.

### Assessment Strategies

- 6.1. Performance
- 6.2. Written Objective Test

## Criteria

*You will know you are successful when*

- 6.1. you describe the phases of microbial growth.
- 6.2. you describe factors which affect microbial growth.
- 6.3. you describe microbial growth characteristics on various media including enriched, selective, and differential media.
- 6.4. you describe the role of enzymes in living organisms.
- 6.5. you differentiate among organisms on the basis of their ability to metabolize different substances.
- 6.6. you define the role and output of glycolysis, fermentation, aerobic, and anaerobic respiration in organism metabolism.
- 6.7. you define aerobic, anaerobic, capnophilic, microaerophilic, and facultatively anaerobic.

## Learning Objectives

- 6.a. Describe the phases of the microbial growth curve: lag, log, stationary, death.
- 6.b. Describe chemical requirements for microbial growth.
- 6.c. Describe physical requirements for microbial growth.
- 6.d. Predict changes in microbial growth within and beyond preferred ranges for temperature, pH, moisture, and oxygen availability.
- 6.e. Explain the function of superoxide dismutase, catalase, and peroxidase.
- 6.f. Define: autotroph, phototroph, chemotroph, heterotroph.
- 6.g. Define: psychrophile, mesophile, thermophile, halophile.
- 6.h. Define: aerobe, anaerobe, facultative anaerobe, microaerophile, capnophile.
- 6.i. Describe enriched media, selective media, and differential media.
- 6.j. Describe microbial growth characteristics on enriched, selective, and differential media.
- 6.k. Describe the role of enzymes in biochemical reactions.
- 6.l. Describe the roles of ATP, NADH, and FADH<sub>2</sub> in microbial metabolism.
- 6.m. Outline the process and products of glycolysis in microbial metabolism.
- 6.n. Outline the process and products of microbial fermentation.
- 6.o. Outline the process and products of aerobic and anaerobic respiration in microbial metabolism.
- 6.p. Compare energy yield among fermentation, aerobic, and anaerobic respiration processes.

- 6.q. Describe the process of binary fission.
- 6.r. Define generation time.

## **7. Classify bacteria based on differentiating characteristics.**

### **Assessment Strategies**

- 7.1. Performance
- 7.2. Written Objective Test
- 7.3. Skill Demonstration
- 7.4. Report

### **Criteria**

*You will know you are successful when*

- 7.1. you evaluate the results of differential stain techniques.
- 7.2. you describe bacteria based on microscopic and macroscopic morphology.
- 7.3. you evaluate the growth of organisms on enriched, selective and differential media.
- 7.4. you recognize environments necessary for growth.
- 7.5. you describe the use of differential tests in identifying bacteria.
- 7.6. you assign bacteria to taxonomic groups based on characteristics.

### **Learning Objectives**

- 7.a. Describe Gram stain results using proper terminology.
- 7.b. Distinguish acid fast bacilli from non-acid fast cells.
- 7.c. Distinguish microbial capsules, flagella, and endospores as observed in prepared slides.
- 7.d. Describe colony morphology accurately.
- 7.e. Interpret reactions observed on enriched, selective, and differential media.
- 7.f. Discuss the benefits to a microbiologist of using enriched, selective, and differential media to isolate microbes from a sample.
- 7.g. Describe optimal environmental requirements for microbial growth.
- 7.h. Explain the conversion of biochemical substrates into products by microbes.
- 7.i. Describe the appearance of positive biochemical reactions.
- 7.j. Utilize dichotomous keys for classification of microbes.
- 7.k. Identify microbes based on morphology and biochemical reactions.

## **8. Assess the impact of microbial genetics on humans and the environment.**

### **Assessment Strategies**

- 8.1. Drawing or Illustration
- 8.2. Written Product

### **Criteria**

*You will know you are successful when*

- 8.1. you outline the processes of DNA replication, transcription and translation.
- 8.2. you differentiate among types of mutation and their impact.
- 8.3. you describe how bacteria can acquire new genetic information.
- 8.4. you describe the role of microbial genetics in biotechnology and molecular diagnostics.
- 8.5. you explain the impact of gene transfer on the spread of antibiotic resistance.

### **Learning Objectives**

- 8.a. Define chromosome, plasmid, genome.
- 8.b. Define genotype and phenotype.
- 8.c. Describe the structure of DNA.
- 8.d. Outline the process of DNA replication.
- 8.e. Define complementary base pairs, codon, and anticodon.
- 8.f. Describe the functions of rRNA, mRNA, tRNA.
- 8.g. Generate a segment of mRNA through transcription given a DNA sequence.
- 8.h. Generate a segment of amino acid chain through translation using the transcribed mRNA.
- 8.i. Define wild type and mutant strain.
- 8.j. Compare the phenotypes of mutant strains to the phenotype of wild type microbes.
- 8.k. Define genetic recombination in microbes.
- 8.l. Describe the processes of transformation, transduction, and conjugation.
- 8.m. Explain the impact of microbial genetic transfer to the spread of antimicrobial resistance and increases

in virulence.

8.n. Describe the role of microbial genetics in biotechnology and molecular diagnostics.

## **9. Evaluate processes to control the growth of microbes in the body and in the environment.**

### **Assessment Strategies**

- 9.1. Written Product
- 9.2. Case Study
- 9.3. Performance

### **Criteria**

*You will know you are successful when*

- 9.1. you differentiate between disinfection and sterilization.
- 9.2. you compare methods of disinfection and sterilization.
- 9.3. you describe modes of action of antibacterial agents.
- 9.4. you differentiate between broad-spectrum and narrow-spectrum agents.
- 9.5. you describe mechanisms of antibiotic resistance.
- 9.6. you identify issues to consider in administering antimicrobial therapies.
- 9.7. you interpret the results of susceptibility testing procedures.

### **Learning Objectives**

- 9.a. Differentiate between disinfection and sterilization.
- 9.b. Describe chemical and physical methods of disinfection.
- 9.c. Describe chemical and physical methods of sterilization.
- 9.d. Define the mode of action of antibacterial agents.
- 9.e. Describe modes of action for select antibacterial agents.
- 9.f. Differentiate between broad-spectrum and narrow-spectrum agents.
- 9.g. Describe mechanisms of antibiotic resistance.
- 9.h. Describe natural selection as it applies to antimicrobial therapy.
- 9.i. Identify issues for consideration in administering antimicrobial therapies.
- 9.j. Perform antimicrobial susceptibility testing.
- 9.k. Interpret results of antimicrobial susceptibility testing.

## **10. Summarize pathogenic and non-pathogenic host-microbe interactions.**

### **Assessment Strategies**

- 10.1. Written Objective Test
- 10.2. Written Product

### **Criteria**

*You will know you are successful when*

- 10.1. you examine symbiotic relationships between humans and microbes.
- 10.2. you identify mechanisms by which microbes cause disease.
- 10.3. you identify the stages of an infectious disease.
- 10.4. you identify the causes of hospital-acquired infections.
- 10.5. you describe the methods of infection control in clinical settings.
- 10.6. you describe the ubiquity of microbes.
- 10.7. you examine the role of opportunists in human disease.
- 10.8. you differentiate among terms used to explain characteristics of infectious disease.

### **Learning Objectives**

- 10.a. Define symbiosis, mutualism, commensalism, parasitism.
- 10.b. Describe ubiquity of microbes.
- 10.c. Describe relationship between humans and normal flora.
- 10.d. List predominant normal flora found in select body sites.
- 10.e. Define portal of entrance, portal of exit.
- 10.f. List methods of attachment used by microbes.
- 10.g. Define virulence, virulence factors, pathogen, and opportunist.
- 10.h. Describe ways microbes evade host immune systems.
- 10.i. Contrast exotoxins and endotoxins.
- 10.j. Describe the circumstances under which opportunists cause disease.
- 10.k. List the stages of infectious disease.

- 10.l. Characterize the stages of infectious disease.
- 10.m. Define nosocomial infection.
- 10.n. Identify causes of nosocomial infection.
- 10.o. Describe methods of infection control in the medical setting.
- 10.p. Define morbidity, mortality, subclinical disease, asymptomatic disease.
- 10.q. Contrast acute and chronic disease.
- 10.r. Contrast primary and secondary disease.

## 11. Analyze patterns of microbial disease transmission using principles of epidemiology.

### Assessment Strategies

- 11.1. Written Objective Test
- 11.2. Case Study
- 11.3. Project

### Criteria

*You will know you are successful when*

- 11.1. you compare communicable and noncommunicable diseases.
- 11.2. you identify possible reservoirs of infection.
- 11.3. you examine various modes of disease transmission.
- 11.4. you differentiate between sporadic, endemic, epidemic, and pandemic conditions.
- 11.5. you evaluate the effect of herd immunity on disease transmission.
- 11.6. you describe methods of controlling disease outbreaks.
- 11.7. you explore new and re-emerging infectious disease agents.

### Learning Objectives

- 11.a. Define reservoir.
- 11.b. Describe possible reservoirs of infection.
- 11.c. Contrast communicable vs. noncommunicable disease; sporadic, epidemic, endemic, pandemic disease.
- 11.d. Contrast direct and indirect disease transmission.
- 11.e. List examples of direct disease transmission.
- 11.f. List examples of indirect disease transmission.
- 11.g. Define herd immunity.
- 11.h. Evaluate effects of herd immunity on disease transmission.
- 11.i. Describe methods to control disease outbreaks.
- 11.j. Explore new and re-emerging microbial pathogens.

## 12. Summarize host defense mechanisms.

### Assessment Strategies

- 12.1. Written Objective Test
- 12.2. Case Study

### Criteria

*You will know you are successful when*

- 12.1. you distinguish between specific and non-specific host defenses.
- 12.2. you identify non-specific host defense mechanisms.
- 12.3. you identify the processes of natural, artificial, passive, and active immunity.
- 12.4. you describe antigen-antibody interactions.
- 12.5. you differentiate between humoral and cell-mediated immunity.
- 12.6. you explain the role of memory cells in lasting immunity.

### Learning Objectives

- 12.a. Contrast non-specific and specific host defense.
- 12.b. Describe non-specific first line host defense mechanisms including physical and chemical barriers to microbes.
- 12.c. Describe the action of lysozyme.
- 12.d. Describe non-specific second line host defense mechanisms including phagocytosis, complement, interferon, leukocytes, inflammation, and fever.
- 12.e. Define antigen.
- 12.f. Characterize classes of antibodies.

- 12.g. Describe antigen-antibody interactions.
- 12.h. Define neutralization, opsonization, agglutination, precipitation as they apply to antigen-antibody interactions.
- 12.i. Describe the process of humoral immune defense.
- 12.j. List potential targets of humoral immune defense.
- 12.k. Define the roles of antigen-processing cells, T helper lymphocytes, B lymphocytes, and plasma cells in antibody production.
- 12.l. Describe the role of memory cells in lasting specific host immunity.
- 12.m. Describe the process of cell-mediated immune defense.
- 12.n. List potential targets of cell-mediated immune defense.
- 12.o. Define roles of antigen-processing cells, T helper lymphocytes, and T cytotoxic lymphocytes in cell-mediated immune defense.
- 12.p. Identify the processes of natural, artificial, active and passive immunity.
- 12.q. List examples of natural, artificial, active and passive immunity.

### **13. Evaluate immunopathology and immunological applications.**

#### **Assessment Strategies**

- 13.1. Written Objective Test
- 13.2. Performance
- 13.3. Report

#### **Criteria**

*You will know you are successful when*

- 13.1. you describe use of vaccines and immune globulins to confer specific immunity.
- 13.2. you differentiate among the types of hypersensitivity.
- 13.3. you explain the health consequences of immune hypersensitivity.
- 13.4. you describe the consequences of immune system dysfunction.
- 13.5. you identify immunological methods of diagnosing infectious disease.

#### **Learning Objectives**

- 13.a. Contrast attenuated vaccine, inactivated vaccine, and toxoid.
- 13.b. Describe the process and outcome of vaccination.
- 13.c. Define immediate hypersensitivity.
- 13.d. Describe the process and outcome of immediate hypersensitivity.
- 13.e. Describe treatments for immediate hypersensitivity.
- 13.f. Define cytotoxic hypersensitivity.
- 13.g. Describe the process and outcome of ABO transfusion reaction.
- 13.h. Predict the outcome of transfusion of like and unlike red blood cell ABO antigens.
- 13.i. Describe the process and outcome of Hemolytic Disease of the Newborn.
- 13.j. Predict the outcome of various combinations of Rh positive or negative mother and fetus.
- 13.k. Describe the method and rationale for prevention of Hemolytic Disease of the Newborn.
- 13.l. Define auto-immune reactions.
- 13.m. List auto-immune diseases.
- 13.n. Discuss the relationship between auto-immune diseases and microbial infections.
- 13.o. Define delayed hypersensitivity.
- 13.p. Describe the process of delayed hypersensitivity.
- 13.q. List examples of manifestations of delayed hypersensitivities.
- 13.r. Discuss the use of the Mantoux/ PPD TB skin test.
- 13.s. Identify immune system dysfunction.
- 13.t. Correlate antigen-antibody interactions to serological lab testing.

### **14. Correlate select bacteria with human infectious disease.**

#### **Assessment Strategies**

- 14.1. Written Objective Test
- 14.2. Case Study
- 14.3. Project
- 14.4. Report

#### **Criteria**



*You will know you are successful when*

- 14.1. you describe microbial characteristics for select organisms.
- 14.2. you describe disease signs and symptoms for select organisms.
- 14.3. you describe disease transmission, diagnosis, treatment, and prevention for select organisms.

#### **Learning Objectives**

- 14.a. Describe disease signs and symptoms, transmission, diagnosis, treatment, and prevention for select Gram-positive bacteria.
- 14.b. Describe reservoirs and characteristics for select Gram-positive cocci.
- 14.c. Describe reservoirs and characteristics for select Gram-positive bacilli.
- 14.d. Describe disease signs and symptoms, transmission, diagnosis, treatment, and prevention for select Gram-negative bacteria.
- 14.e. Describe reservoirs and characteristics for select Gram-negative cocci.
- 14.f. Describe reservoirs and characteristics for select Gram-negative bacilli.
- 14.g. Differentiate Enterobacteriaceae from non-Enteric pathogens.
- 14.h. Describe disease signs and symptoms, transmission, diagnosis, treatment, and prevention for select unusual bacteria.
- 14.i. Describe reservoirs and characteristics for select unusual bacteria.
- 14.j. Differentiate between food borne intoxication and food borne infection.
- 14.k. Describe methods to control food and water borne disease.
- 14.l. List bacterial pathogens which show particular resistance to antibiotics.
- 14.m. Describe the life cycle of Chlamydial organisms.
- 14.n. Characterize the stages of infection for the bacteria that cause syphilis and Lyme disease.
- 14.o. List the bacterial pathogens most often implicated in nosocomial infections.
- 14.p. List the bacterial pathogens most often implicated in neonatal infections.
- 14.q. List the bacterial pathogens which are reportable to public health agencies.

### **15. Correlate select fungi and parasites with human infectious disease.**

#### **Assessment Strategies**

- 15.1. Written Product
- 15.2. Case Study

#### **Criteria**

*You will know you are successful when*

- 15.1. you define eukaryotic parasites.
- 15.2. you describe characteristics of select fungi.
- 15.3. you describe characteristics of select protists and helminths.
- 15.4. you describe disease signs and symptoms for select organisms.
- 15.5. you describe disease transmission, diagnosis, treatment, and prevention of select organisms.

#### **Learning Objectives**

- 15.a. Describe eukaryotic parasites.
- 15.b. Describe conditions that determine progression of exposure to fungal microbes to disease by fungal microbes.
- 15.c. Discuss fungal opportunistic pathogens.
- 15.d. Describe reservoir and characteristics of select fungi.
- 15.e. Describe disease signs and symptoms, transmission, diagnosis, treatment, and prevention of select fungi.
- 15.f. Define protozoa and helminth pathogens.
- 15.g. Describe parasitic forms of protists and helminths.
- 15.h. Correlate parasitic forms with signs and symptoms of disease.
- 15.i. Outline select parasitic life cycles.
- 15.j. List protozoan pathogens most often implicated in neonatal infections.
- 15.k. Describe disease signs and symptoms, transmission, diagnosis, treatment, and prevention of select protists and helminths.
- 15.l. Describe reservoir and characteristics of select protists and helminths.

### **16. Correlate select viruses and prions with human infectious disease.**

#### **Assessment Strategies**

- 16.1. Written Objective Test
- 16.2. Case Study

### **Criteria**

*You will know you are successful when*

- 16.1. you describe viral morphology and the processes of viral replication.
- 16.2. you analyze the impact of viruses on a host organism.
- 16.3. you describe disease signs and symptoms for select viruses.
- 16.4. you describe disease transmission, diagnosis, treatment, and prevention for select viruses.
- 16.5. you describe prions and associated diseases.

### **Learning Objectives**

- 16.a. Define virus pathogen.
- 16.b. Name virus component parts.
- 16.c. Describe the function of virus component parts.
- 16.d. Describe the relationship between virus and host cell including host specificity.
- 16.e. Describe the stages of virus life cycle.
- 16.f. Define cytopathic effect.
- 16.g. Define lysogeny, prophage, latency, and reactivation.
- 16.h. Contrast viral lytic cycle, viral lysogeny, and viral latency.
- 16.i. Define oncogenic.
- 16.j. Correlate infection with some virus pathogens and their associated cancers.
- 16.k. List typical means of transmission of virus pathogens.
- 16.l. Describe reservoirs and characteristics of select viruses.
- 16.m. Explain the role of reverse transcriptase in HIV infection.
- 16.n. Outline the process and effect on CD4 cells from initial HIV infection to the development of AIDS.
- 16.o. Explain the case definition of AIDS.
- 16.p. Summarize the difficulties in treatment and prevention of HIV infection and AIDS.
- 16.q. Identify particular at-risk groups for HIV infection.
- 16.r. List major blood borne virus pathogens.
- 16.s. Associate Universal Precautions with preventing the spread of blood borne pathogens.
- 16.t. Define prion.
- 16.u. Describe transmission, signs, and symptoms of prion disease.